

MATERIAL SAFETY DATA SHEET USER'S GUIDE



Prevention, I'm working at it!

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**MATERIAL
SAFETY
DATA SHEET
USER'S GUIDE**

Writing

Michel Gagné

Anne-Marie Filion

Johanne Dumont

Service du répertoire toxicologique, CSST

Linguistic revision

Direction des communications, CSST

Electronic publishing

Danielle Gauthier and Chantal Grandmont, CSST

Illustrations

Ronald Du Repos

Production

Direction des communications, CSST

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Note. – The use of the masculine in this document also includes women.

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*Non-essential information for WHMIS purposes

INTRODUCTION

The role of the **Service du répertoire toxicologique** of the **Commission de la santé et de la sécurité du travail** (CSST) is to inform Québec employers and workers of the health and safety hazards of chemical or biological substances used in the workplace.

The purpose of this guide is to facilitate the understanding and use of the information provided on a material safety data sheet by defining, for example, a product's properties and by showing how to use the MSDS for prevention. A glossary of the main terms used in material safety data sheets, the measurement units, and the conversion factors most frequently used are also presented in the appendix.

WHMIS

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM

WHMIS is a Canada-wide system for protecting the health and safety of workers by facilitating access to information on the hazardous materials used in the workplace. This system consists of three parts, namely material safety data sheets, labels and the worker training program.

For more information on WHMIS, consult the *Regulations* section of this guide.

MATERIAL SAFETY DATA SHEET (MSDS)

A material safety data sheet is a document that provides information on a controlled product, namely its toxic effects, the protective measures for avoiding overexposure or chemical hazards, and the procedures to follow in an emergency. A controlled product is a hazardous material meeting the hazard criteria defined in the *Controlled Products Regulations*. The information provided on the MSDS completes the information that is found on the label of a controlled product. The supplier sends the MSDS to the employer when the product is sold. It must be available in French and in English, be kept on the premises by the employer in a location known by the workers, and be easily and rapidly accessible to those who are likely to come in contact with the product.

INFORMATION TO DISCLOSE ON THE MATERIAL SAFETY DATA SHEET

The material safety data sheet must contain nine categories of information. They can be presented under the following headings or under equivalent headings.

- Product information
- Information on the preparation of the MSDS
- Hazardous ingredients
- Physical data
- Fire and explosion hazards
- Reactivity data
- Toxicological properties
- Preventive measures
- First aid measures

The internationally harmonized material safety data sheet, consisting of 16 categories of information, is accepted in Canada insofar as it contains the information required by WHMIS and that it mentions that the product has been classified in accordance with the hazard criteria listed in the *Controlled Products Regulations*.

PRODUCT INFORMATION

This section of the MSDS includes the following:

- Product identifier/name.
- Manufacturer's name, street address, city, province, postal code and emergency telephone number.
- Supplier identifier/name, street address, city, province, postal code and emergency telephone number, if it is different from that of the manufacturer.
- Product use.

The product's name indicated on the MSDS must be identical to the name written on the label.

Example

Material safety data sheet

Product identifier/name:

Toluène/Toluene

Manufacturer's identifier/name:

Produits chimiques ABC inc.

1234, rue ABC

Montréal (Québec) Z0Z 0Z0

Emergency telephone no.: 1 800 123-4567

Supplier's identifier/name:

Distributions XYZ

123, rue XYZ

Québec (Québec) X0X 0X0

Emergency telephone no.: 1 800 987-6543

Product use:

Paint solvent

Label:



PREPARATION INFORMATION

This section of the MSDS includes the following:

- Name and telephone number of the group, department or party responsible for the preparation of the material safety data sheet.
- Date of preparation of the material safety data sheet.

The material safety data sheet must be revised at least every three years or as soon as new pertinent information becomes available.

HAZARDOUS INGREDIENTS

This section of the MSDS includes the following:

CHEMICAL NAME AND CONCENTRATION OF INGREDIENTS,

- i) which are controlled products if they are present at a concentration equal to or greater than **0.1%** in the mixture (applies to ingredients that are teratogenic, embryotoxic, carcinogenic, toxic to reproduction, mutagenic and respiratory tract sensitizers). In other cases, ingredients that are themselves controlled products and whose concentration is above **1%** are disclosed;
- ii) which are on the ingredient **disclosure list**, if their concentration is equal to or greater than the concentration on this list (even if the ingredient is not a controlled product as defined in WHMIS);
- iii) which the supplier believes, based on reasonable grounds, **to be harmful to the health** of the workers;
- iv) whose **toxicological properties are unknown**.

The concentration is defined as being the amount of a component in the total amount of the mixture. It can be expressed as a percentage (%) and interpreted as being a ratio:

- Weight of component/weight of mixture (W/W),
or
- Weight of component/volume of mixture (W/V),
or
- Volume of component/volume of mixture (V/V).

On the MSDS, the actual concentration of the ingredient can be replaced by one of the following permitted ranges of concentrations, namely:

- | | |
|--------------------|-------------------|
| • from 0.1 to 1% | • from 10 to 30% |
| • from 0.5 to 1.5% | • from 15 to 40% |
| • from 1 to 5% | • from 30 to 60% |
| • from 3 to 7% | • from 40 to 70% |
| • from 5 to 10% | • from 60 to 100% |
| • from 7 to 13% | |

CAS REGISTRY NUMBER

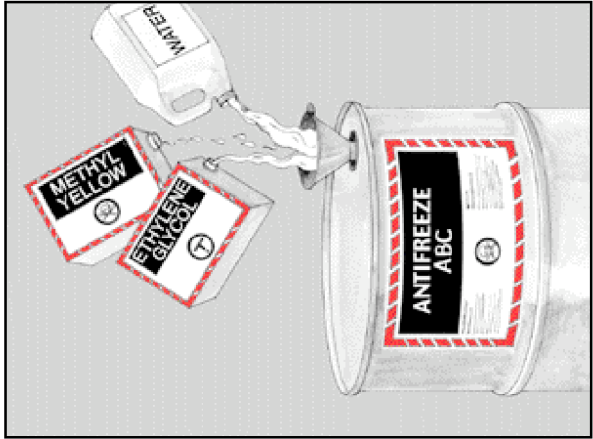
The CAS number is assigned by the *Chemical Abstracts Service*, a division of the *American Chemical Society*, to precisely identify a chemical substance.

LETHAL DOSE 50 (LD₅₀)

This is the amount of a substance that causes the death of 50% of the laboratory animals exposed to it orally (ingestion) or cutaneously. There are other routes of entry (for example by injection), but WHMIS does not take them into account.

LETHAL CONCENTRATION 50 (LC₅₀)

This is the concentration of a substance in the air that causes the death of 50% of the laboratory animals exposed to it by inhalation, generally for 4 hours.



Examples

Pure product:

Hazardous ingredient	CAS	Concentration	LD ₅₀	LC ₅₀
Ammonia	7664-41-7	60-100%		Rat: 2,000 ppm/4 h

Product composed of several ingredients:

Hazardous ingredients	CAS	Concentration	LD ₅₀	LC ₅₀
Methyl yellow	60-17-7	0.1-1%	Rat, oral: 200 mg/kg Mouse, oral: 300 mg/kg	
Ethylene glycol	107-21-1	60-100%	Rat, oral: 4.7 g/kg Mouse, oral: 7.5 g/kg Rabbit, skin: 9.5 g/kg	

PHYSICAL DATA

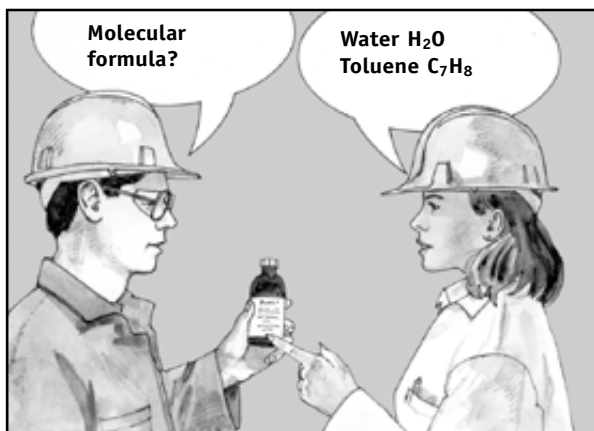
This section of the MSDS describes the physico-chemical characteristics of a substance based on current scientific knowledge.

MOLECULAR FORMULA

The molecular formula describes, using their symbols, the elements that make up a substance, and indicates their proportion. Pure substances are the only ones with a definite molecular formula.

Examples

Water: H_2O , **Toluene:** C_7H_8



MOLECULAR WEIGHT

This is the weight in grams of a fixed quantity of molecules of a chemical product. The molecular weight is defined only for pure chemical substances.

Example

Toluene: 92.15 g

PHYSICAL STATE

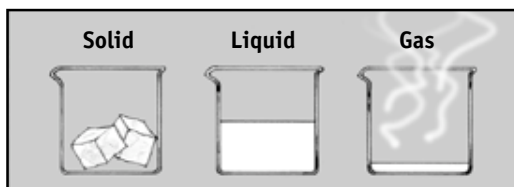
This is the form or state in which the product is present: gas, liquid or solid at ambient temperature (20°C) and at normal atmospheric pressure (760 mm Hg (101.32 kPa)).

Example

Solid: lime

Liquid: water

Gas: oxygen



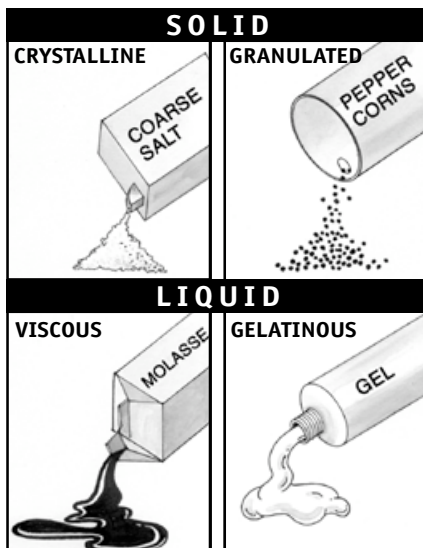
APPEARANCE

This subsection provides specific information on the product or presents additional information on the product's physical state or appearance.

Examples

If the product is solid, it can be crystalline, granular, powdery, etc.

If it is liquid, it can be viscous, gelatinous, oily, etc.



COLOUR AND ODOUR

These are some of the product's physical characteristics. A product can have a specific colour or be colourless. It may have a characteristic and distinctive odour or be odourless. The odour of some products may be detected, starting at a certain concentration, namely the odour threshold.

Examples

Colour:

- gray: copper sulfate
- colourless: water

Odour:

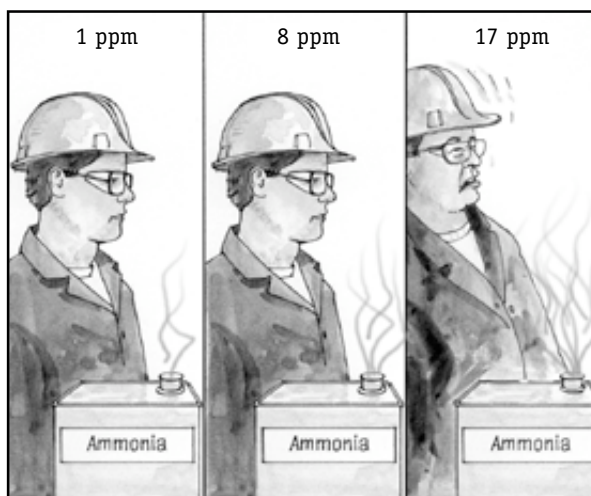
- aromatic: toluene
- characteristic: chloroform

ODOUR THRESHOLD

This is the minimum concentration of a substance likely to be detected in the air by human smell. It is usually expressed in parts per million (ppm).

Example

Ammonia can be detected at 17 ppm.



DENSITY

Density is a physicochemical property related to the weight of a substance. It represents the weight of a substance per unit volume and is expressed in grams per millilitre (g/ml) at 20°C.

Specific gravity is also a physicochemical property that is commonly used instead of density. However, it is a relative value that indicates how many times heavier than water the product is. If the density of a product that is rather insoluble in water is less than 1 g/ml, the product will float. However, if it is greater than 1 g/ml, the product will sink. This information is useful in predicting the behaviour of a product in the event of a leak or accident.

Example

Toluene is not very soluble in water. Its density is 0.8661 g/ml, therefore less than 1, so it floats on water.

FREEZING POINT

This is the temperature at which a substance goes from the liquid state to the solid state at normal atmospheric pressure (760 mm Hg (101.32 kPa)). The freezing point of a pure substance is the same as its melting point.

Example

Water crystallizes at 0°C.

MELTING POINT

This is the temperature at which a substance goes from the solid state to the liquid state at normal atmospheric pressure (760 mm Hg (101.32 kPa)).

Example

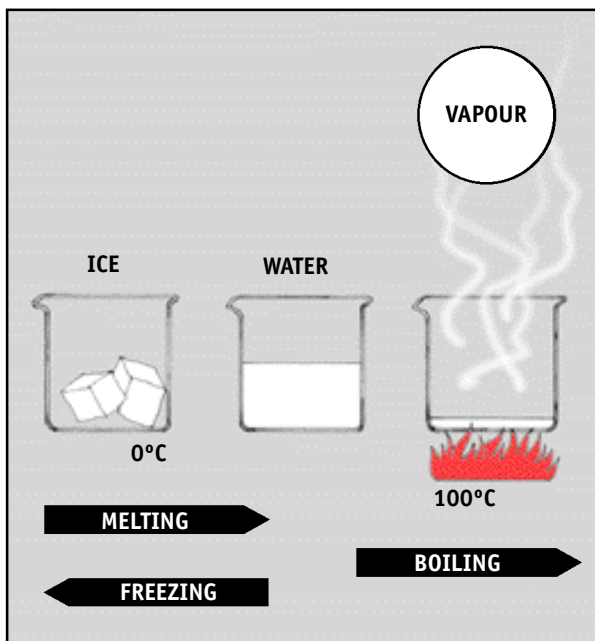
Ice melts at 0°C.

BOILING POINT

This is the temperature at which a substance goes from the liquid state to the gaseous state at normal atmospheric pressure (760 mm Hg (101.32 kPa)).

Example

Water boils at 100°C.

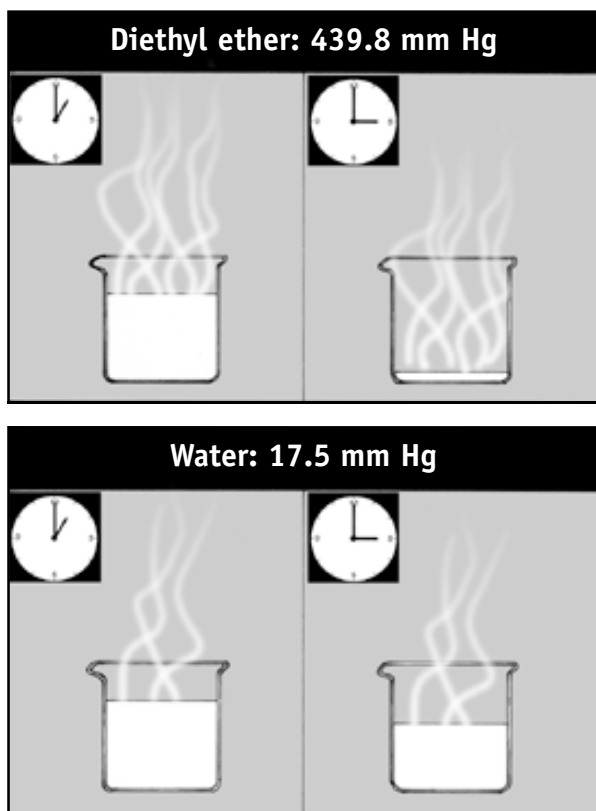


VAPOUR PRESSURE

When a substance evaporates, its vapours exert pressure in the ambient environment. Vapour pressure is expressed in millimetres of mercury (mm Hg) or in kilopascals (kPa) at 20°C and normal atmospheric pressure of 760 mm Hg (101.32 kPa). A vapour pressure greater than 760 mm Hg (101.32 kPa) indicates that the substance is in the gaseous state. The higher a substance's vapour pressure, the more it tends to evaporate.

Example

The vapour pressure of water is 17.5 mm Hg (2.33 kPa) and that of diethyl ether, 439.8 mm Hg (58.63 kPa). Therefore, diethyl ether evaporates faster than water.



CONCENTRATION AT SATURATION

This is the maximum concentration that a substance can reach in the air at equilibrium, 20°C and normal atmospheric pressure of 760 mm Hg (101.32 kPa).

Example

Toluene has a concentration at saturation of 28,800 ppm.

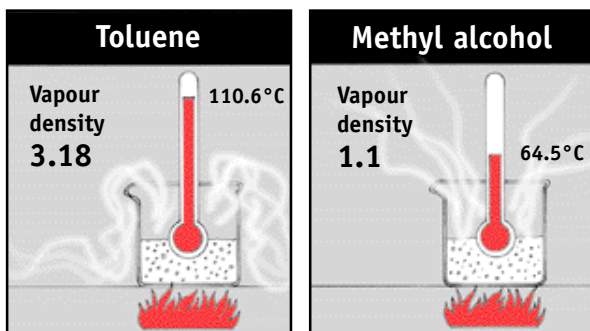
VAPOUR DENSITY

This information indicates how many times the vapours of a substance are heavier or lighter than air (air = 1). This measurement is taken at the boiling point.

If the vapour density is greater than 1, a substance's vapours will tend to remain near the ground.

Examples

- Toluene has a vapour density of 3.18. Therefore, at its boiling point, its vapours will tend to remain at the ground.
- Methyl alcohol has a vapour density of 1.1. Therefore at its boiling point, its vapours will mix easily with air, since its vapour density is close to 1.



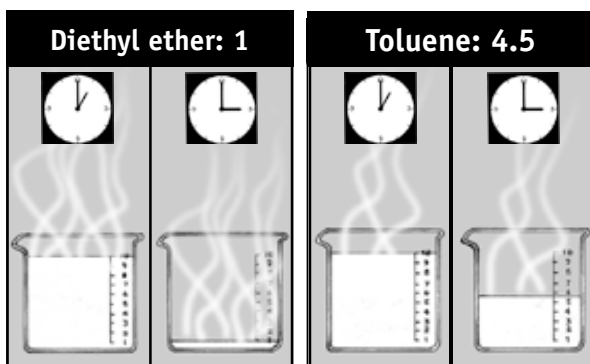
Note. – The behaviour of vapours is valid only for a rather short period of time and at a temperature close to the boiling point. The vapours given off by a boiling substance disperse into the air over time. The tendency of vapours to remain close to the ground decreases as the difference between the ambient temperature and the boiling point increases.

EVAPORATION RATE

The evaporation rate indicates the relationship between the time that a product takes to evaporate and the time that a reference product takes to evaporate. It indicates, at equal volume, how many times longer a product takes to evaporate than another. The rate varies with the type of product and the temperature. Diethyl ether, for example, is the reference product on which the most data is available.

Example

Toluene's evaporation rate is 4.5 in relation to that of diethyl ether. Therefore, toluene takes 4.5 times longer than diethyl ether to evaporate.



Note. – There are other reference products, such as n-butyl acetate, which are used to establish an evaporation rate. There are also other ways of establishing the evaporation rate. One of the methods used consists of determining, for the same period, the ratio of the volumes of the target product and reference product that evaporated. Another method consists of determining, for the same initial volume of liquid, the ratio of the percentages of the target product and reference product that evaporated. Unfortunately, sometimes a value is given without the method used being indicated.

COEFFICIENT OF WATER/OIL DISTRIBUTION

This is the ratio of the solubility of a product in oil to its solubility in water when they are brought into contact with the product.

A value below 1 indicates a better solubility of the product in oils and greases. The product is therefore likely to be absorbed by the skin. However, a value greater than 1 indicates a better solubility in water. This product could therefore be absorbed by the mucous membranes. This information can be useful in evaluating the first aid to be given and can facilitate the choice of protective equipment.

Example

Toluene has a coefficient of water/oil distribution of 0.0026. Therefore, toluene is more soluble in oil than in water with a value of 0.0026 g in water to 1 g in oil.

Note. – On some material safety data sheets, the distribution coefficient is expressed as log Pow, therefore as the logarithm of the n-octanol/water partition coefficient. n-Octanol is in fact the reference substance that is closest to oil. The method for converting log Pow into the coefficient of water/oil distribution is described in the *Conversion factors* section of this guide.

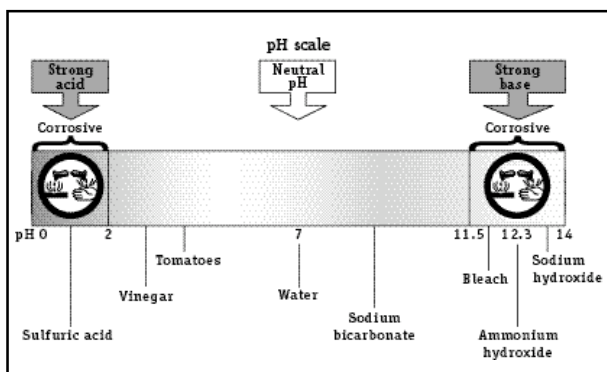
pH

The pH, expressed as a numerical value, indicates whether a solution is acidic or basic. Water is neutral and has a pH of 7. Acids have a pH below 7, and the lower the value, the stronger the acid. Bases have a pH greater than 7, and the higher the value, the stronger the base.

Examples

Vinegar (acid): pH = 2.1

27-30% **Ammonium hydroxide** (base): pH = 12.3



Note. – For regulation purposes, particularly WHMIS, a substance is considered corrosive if its pH is equal to or less than 2 or equal to or greater than 11.5. However, tests carried out on animals that prove that the substance is not corrosive predominate over the pH value.

SOLUBILITY IN WATER AT SATURATION

This is the maximum amount of a product that can be dissolved in water. It is expressed in grams per litre at a temperature of 20°C. If the solubility is not precisely known, the product is called, for example, “insoluble”, “slightly soluble” or “very soluble”. A liquid that mixes perfectly with water to form a single phase is called “miscible”.

PARTICLE SIZE

The particle size indicates the size of the particles forming a powder, a dust, a mist, an aerosol or fumes. Particles smaller than $1\mu\text{m}^*$ can penetrate deeply into the respiratory tract and deposit in the alveoli. Slightly larger particles (from 1 to $5\mu\text{m}$) reach the trachea, bronchi and bronchioles. Larger particles (from 5 to $30\mu\text{m}$) reach the nose and pharynx region. Even larger particles (larger than $30\mu\text{m}$) rarely penetrate the upper respiratory tract. Depending on the substance, they may dissolve and be absorbed by the body. Therefore, by knowing the size of the particles of a substance, one can decide on the corrective measures to adopt to reduce or eliminate the hazard at source (for example, by planning for local ventilation). If it is impossible to reduce or eliminate the hazard at source, knowledge of the particle size will make it easier to choose the respiratory protection device.

* $1\mu\text{m}$ (micron) represents 10^{-6} metres (0.000001 metre) or 10^{-3} millimetres (0.001 mm). For example, $1\mu\text{m}$ is approximately 1,000 times smaller than a grain of sand.

Less than 1 μm



1 to 5 μm



5 to 30 μm



More than 30 μm



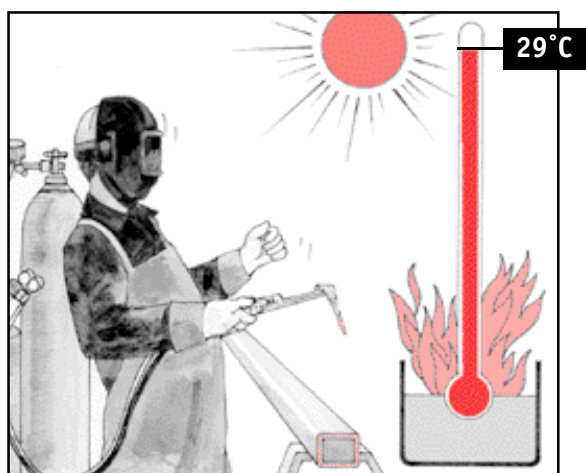
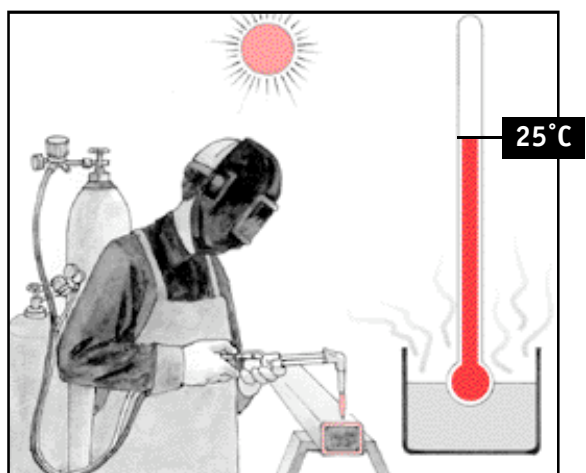
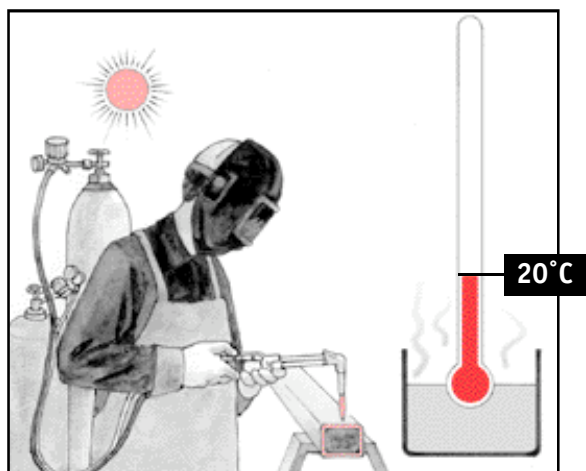
FIRE OR EXPLOSION HAZARD

FLASH POINT AND METHOD OF DETERMINATION

The flash point is the lowest temperature at which a substance gives off sufficient vapours to form a flammable mixture with the air on contact with a flame or spark. A product's flash point is determined by either of the two following methods: in a **closed cup**, meaning inside the container that contains it, or in an **open cup**, meaning near the surface of the liquid. The lower a liquid's flash point, the greater the risk of fire.

Example

Normal butanol has a flash point in a closed cup of 29°C (*Set-a-flash* method). It is therefore extremely flammable on a hot summer day when its vapours come in contact with a flame or spark.

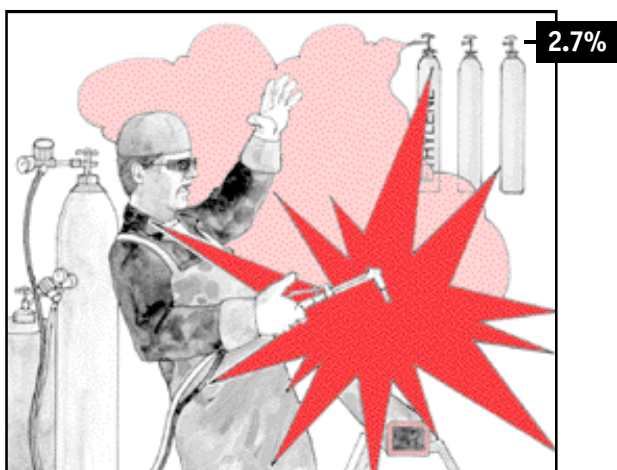
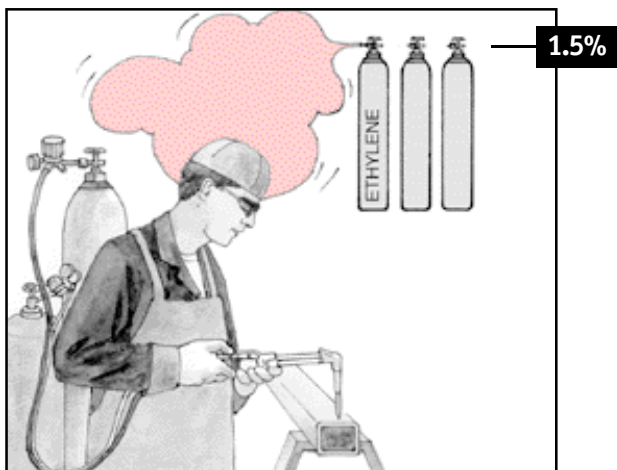
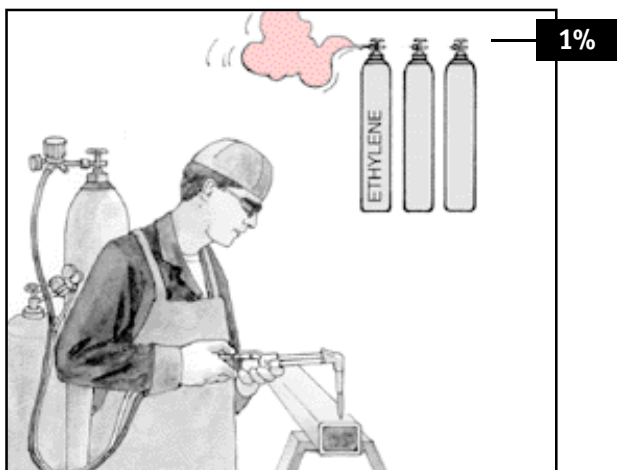


LOWER AND UPPER EXPLOSIVE OR FLAMMABLE LIMITS

These are the minimum and maximum concentrations of a product in the air between which a flammable or explosive mixture can form in the presence of an ignition source. These concentrations are expressed as a percentage of the volume in the air.

Example

Ethylene has a lower explosive limit of 2.7% and an upper limit of 36%. Therefore, in the presence of an ignition source, if the concentration of the gas is less than 2.7% or greater than 36%, there is no risk of explosion. But if the concentration of the substance is between these two limits, the mixture could explode. The concentration of the product in the air must be kept under its lower explosive limit, for example by using appropriate ventilation.

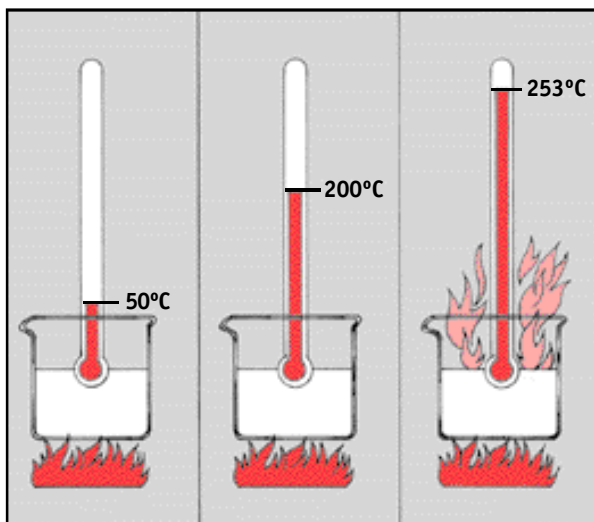


AUTO-IGNITION TEMPERATURE

This is the lowest temperature at which spontaneous combustion of a product occurs. It begins to burn by itself in the absence of any flame or spark. The closer the auto-ignition temperature is to the ambient temperature, the greater the risk of fire.

Example

Turpentine has an auto-ignition temperature of 253°C. Therefore, it will not burst into flame by itself at ambient temperature.



CONDITIONS OF FLAMMABILITY

Conditions of flammability indicate whether a product could burst into flame and under what conditions.

Example

Toluene is a flammable liquid and will therefore burst into flame if it is near a source of ignition.

Note. – When a substance is classified “flammable”, the necessary precautions must be taken to avoid it reaching its auto-ignition temperature or its flash point, depending on the case.

EXPLOSION CONDITIONS

Explosion conditions indicate whether a product is likely or not to explode when it is used.

Example

Toluene vapours form an explosive mixture with air.

EXPLOSION DATA — SENSITIVITY TO MECHANICAL IMPACT

These data indicate whether or not there is a risk of explosion on impact, and if so, specify under what conditions the explosion could occur.

Example

Picric acid may explode on impact.

EXPLOSION DATA — SENSITIVITY TO STATIC DISCHARGE

These data indicate whether or not there is a risk of explosion with a static discharge, and if so, under what conditions explosion could occur.

Example

When xylene is shaken or when it flows in pipes, it can accumulate a static charge that may cause the vapours to ignite.

MEANS OF EXTINCTION

This subsection contains a list of the extinguishing agents to use to fight a fire when this product is present or when it is the cause of the fire.

Example

Toluene: Carbon dioxide, dry chemical, water spray, alcohol foam.

SPECIAL PRECAUTIONS

This subsection describes the special precautions to take to fight a fire when this product is present or when it is the cause of the fire. Also indicated are the specific means for avoiding an explosion or the propagation of the fire.

Example

Toluene: Wear a self-contained breathing apparatus. The vapours are heavier than air and can travel a great distance towards a source of ignition and thus cause flashback.

HAZARDOUS COMBUSTION PRODUCTS

This subsection lists the combustion products that are health and safety hazards and that may form when the substance burns.

Example

Toluene: Carbon dioxide, carbon monoxide.

REACTIVITY DATA

CONDITIONS OF CHEMICAL INSTABILITY

This information indicates whether a substance is stable and, if need be, indicates the conditions that produce chemical instability.

Example

Sodium hypochlorite gives off toxic fumes of chlorine when it is heated. Appropriate ventilation must be provided to ensure that the permissible limit values are not exceeded.



NAME OR CLASS OF SUBSTANCES WITH WHICH THE PRODUCT IS INCOMPATIBLE

This subsection indicates whether a product must not be brought into contact with certain specified substances, and if need be, specifies the nature of the hazard if the product is brought into contact with these substances.

Example

12% bleach is incompatible with strong acids. On contact, it gives off toxic chlorine vapours.



CONDITIONS OF REACTIVITY

This indicates whether a substance is likely to react violently or dangerously under normal conditions of use. If need be, the nature of the hazard is specified.

Example

12% bleach is unstable in the presence of light and metals or when the pH of the solution becomes less basic.

HAZARDOUS DECOMPOSITION PRODUCTS

This subsection lists the products that are health and safety hazards that are likely to form when a substance decomposes. Decomposition may be the result of a reaction occurring at room temperature, exposure to light, or the effect of heat on the substance, etc.

Example

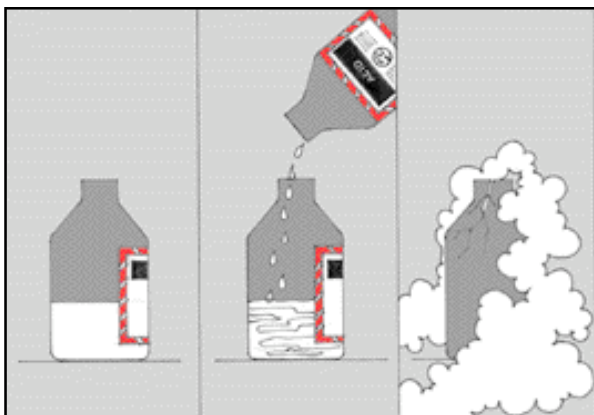
Ammonia: thermal decomposition (begins between 450°C and 500°C), giving off nitrogen and hydrogen.

POLYMERIZATION

This subsection indicates whether the substance can change into a polymer (the combining of several molecules) and under what conditions this change occurs. The heat given off and/or the expansion in volume caused by the polymerization reaction could cause the container to burst and the remaining product (unpolymerized) to spill. These accidents can be avoided by controlling the polymerization conditions.

Example

Exposure to light or contact with strong acids or bases can cause acrolein to polymerize.



TOXICOLOGICAL PROPERTIES

ROUTES OF ENTRY, SKIN AND EYE CONTACT

This section indicates the routes by which the substance can enter the body and produce harmful effects. These routes include the respiratory tract (inhalation), skin (cutaneous absorption) and the digestive tract (ingestion). Also included is any surface of the body on which the substance can produce a harmful effect by direct contact.

Examples

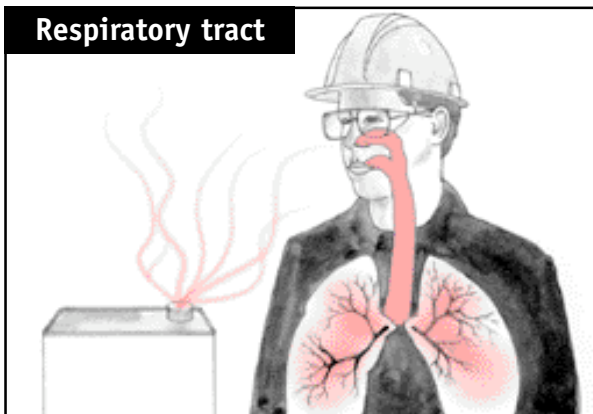
Routes of entry

Toluene: The substance is absorbed through the respiratory tract, skin and digestive tract.

Skin and eye contact

Sulfuric acid: Following direct contact with the skin and eyes, this product may cause burns.

Respiratory tract



Digestive tract



Skin

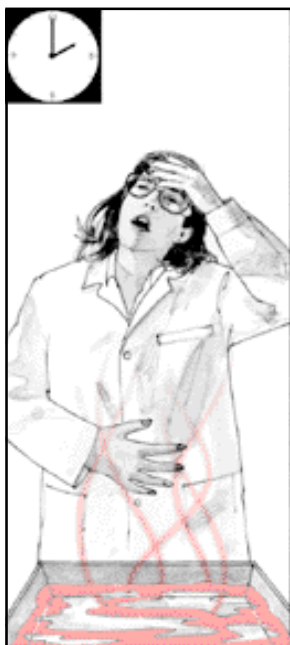


EFFECTS OF ACUTE EXPOSURE TO PRODUCT

These health hazards result from short-term exposure to the controlled product. Acute exposure is generally defined as a single or repeated exposure over a 24-hour period. Often, acute poisoning produces brief and reversible toxic effects. However, some effects may show up only several hours after intoxication. Also, some serious poisonings may produce sequellae.

Example

Exposure to high concentrations of acetone vapours (above 12,000 ppm) may cause dryness of the mouth and throat, salivation, anorexia, headache, nausea, vomiting, dizziness, incoordination, asthenia, lethargy and ataxia. In extreme cases, it can lead to stupor or coma.

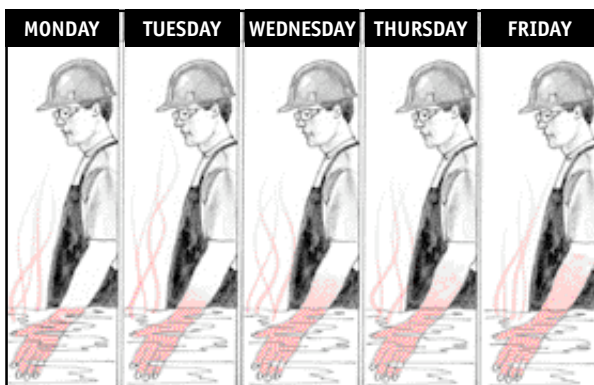


EFFECTS OF CHRONIC EXPOSURE TO PRODUCT

These health hazards result from prolonged exposure to the controlled product at concentrations lower than those that produce acute effects. The duration of the exposure can vary (weeks, months, years).

Example

The repeated inhalation of styrene vapour may cause nervous system disorders that first appear as headache, nausea, dizziness, a loss of appetite, and general weakness. The following effects may subsequently be observed: increased reaction time, difficulty with colour perception, etc. Repeated skin contact with the product may cause redness, desquamation and cracking of the skin.



1st WEEK

2nd WEEK

3rd WEEK

4th WEEK



EXPOSURE LIMITS

Exposure limits are the concentrations permitted in the air for a given substance. They represent the concentrations of the substance in the air to which the great majority of workers can be exposed daily, without suffering harmful effects. There are three types of values:

- Short-term exposure values, which are measured for a maximum duration of 15 minutes;
- Time-weighted average exposure values, which are measured for the duration of an 8-hour work shift;
- Ceiling values, which must never be exceeded for any period of time whatsoever.

On the material safety data sheet, the permissible limit values in Québec, which are specified by the *Regulation respecting occupational health and safety* (S-2.1, R.19), are sometimes presented. For more details, consult the *Regulations (ROHS)* section of this guide. However, the limit values recommended by the ACGIH® (*American Conference of Governmental Industrial Hygienists*), an American organization, are often the ones that appear on the MSDS. Exposure limit values are given in ppm, in mg/m³ or in fibres/cm³.

If a product consists of several ingredients, the exposure limit for each of the ingredients must be indicated on the MSDS.

IRRITANCY AND CORROSIVENESS

This subsection indicates whether the substance may cause irritation of the eyes, skin or mucous membranes of the respiratory and digestive tracts. A substance's irritating effects on the eyes or skin may be, for example, a minor tingling sensation to erythema (redness) or edema (swelling). This damage is **reversible**, meaning that it disappears with time, when exposure to the product stops. If the damage caused by a substance is **irreversible**, the substance is said to be corrosive.

Examples

Isopropyl alcohol is moderately irritating to the eyes and slightly or not irritating to the skin. Exposure to vapours of this substance may cause irritation of the eyes and upper respiratory tract.

Sodium hydroxide is a corrosive product that may cause serious burns accompanied by deep ulceration of the skin. On the eyes, it causes disintegration and escharification of the conjunctiva and cornea accompanied by edema and ulceration. Permanent opacification of the cornea is also possible. Exposure to dusts or mists may cause irritation and ulceration of the nasal passages. Pulmonary edema may occur with exposures to high concentrations of dusts or mists.

SENSITIZATION TO PRODUCT

Sensitization is an immune reaction of the body. It occurs following exposure to a chemical or biological substance and produces an allergic response of the respiratory tract (rhinitis, asthma) or skin (eczema). Exposure to the sensitizing substance may have previously produced no symptoms, until an initial allergic response occurs.

Examples

After an initial contact with isocyanates (TDI, HDI, MDI, etc.), subsequent contact may produce sensitization of the respiratory tract (asthma) in some people.

Formaldehyde (used as a preservative in various types of products such as cutting oils) is a skin sensitizer.

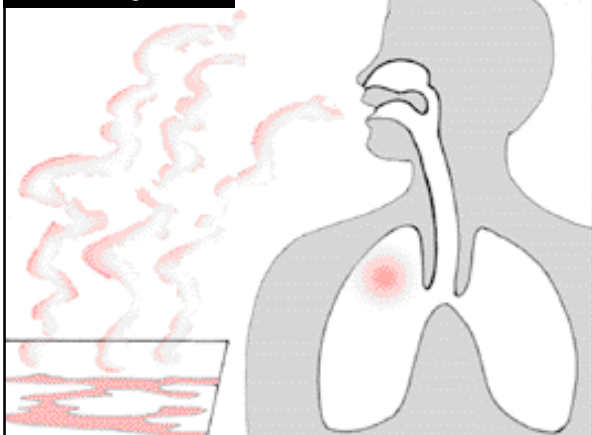
CARCINOGENICITY

This subsection specifies whether the substance can cause cancer or not. WHMIS uses the IARC (*International Agency for Research on Cancer*) and ACGIH® (*American Conference of Governmental Industrial Hygienists*) classifications to determine a substance's carcinogenic potential. A substance classified A1 and A2 by the ACGIH, or group 1, 2A and 2B by IARC, is recognized as carcinogenic by WHMIS. Substances can be listed as proven, probable or possible carcinogens, depending on the evidence observed.

Example

The *International Agency for Research on Cancer* (IARC) considers styrene as a possible human carcinogen (group 2B).

0 to 5 years



5 to 10 years



10 to 15 years



REPRODUCTIVE TOXICITY

Some substances can have toxic effects on reproduction, meaning that they can cause a change in fertility, thus affecting a woman's or a man's reproductive capability. For example, some substances may affect hormonal activity, spermatogenesis, etc., which may affect fertility.

Example

Carbon disulfide may cause sperm disorders as well as menstrual disorders in humans.

TERATOGENICITY

This section states whether the substance can cause malformations in newborns. The *Controlled Products Regulations* require that all effects on development be mentioned, and therefore embryotoxic and fetotoxic effects (effects other than malformations) must appear on the MSDS. These may include, for example, a reduction in body weight, growth retardation, dysfunction, death, etc. Effects on postnatal development (after birth) are also indicated. Most of the time, the information comes from animal studies.

Example

Toluene has an embryotoxic and/or fetotoxic effect on animals.

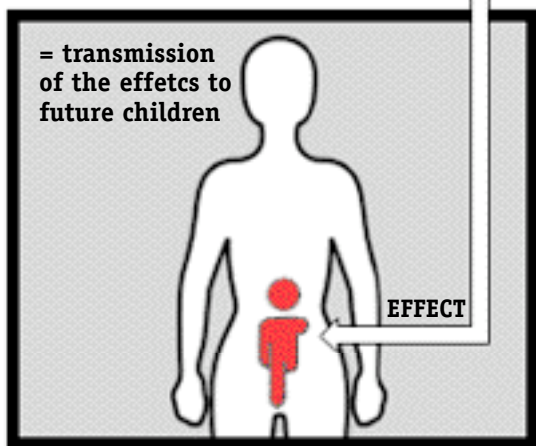
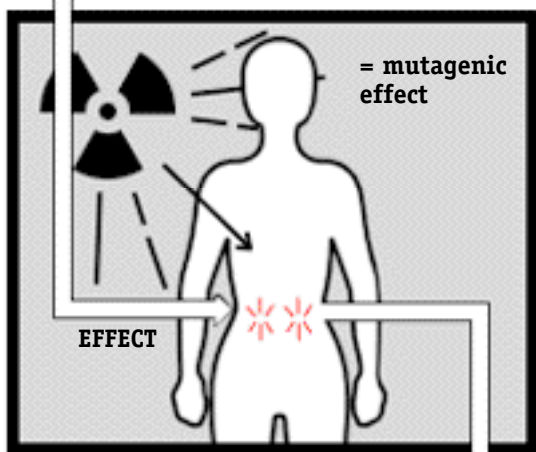
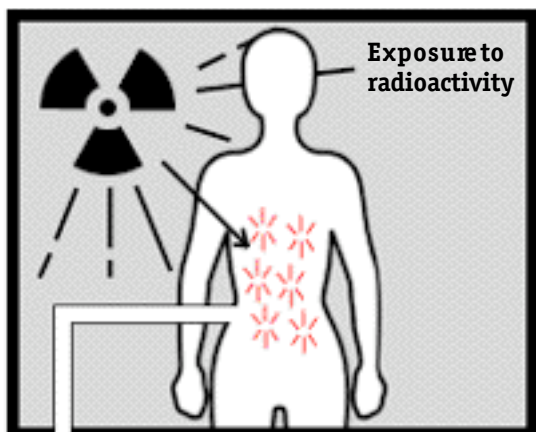


MUTAGENICITY

This subsection indicates whether the substance may cause mutations (changes) in the genetic material (DNA) of cells. Mutations in the DNA of reproductive or germ cells (eggs or sperm) may cause hereditary effects, meaning that they are transmissible to offspring. Effects on other cells (nonreproductive or somatic cells) do not cause hereditary effects, but may lead to cell death, the transmission of the mutation to cells of the same tissue, or cancer.

Example

Benzene is a human mutagen.



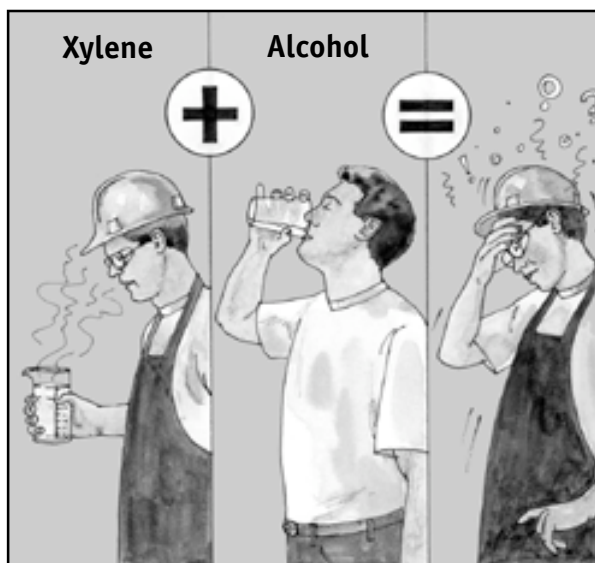
NAMES OF TOXICOLOGICALLY SYNERGISTIC PRODUCTS

These are substances or products that interact with the controlled product to produce a toxic effect greater than the sum of their individual effects.

There are other types of interactions between chemical products, namely antagonism (reduced toxic effects), the additive effect (effects that are added), etc. However, the *Controlled Products Regulations* do not require that these effects be mentioned on the MSDS.

Example

The duration of xylene's toxic effects increases with the consumption of alcohol or aspirin.



PREVENTIVE MEASURES

This section contains useful information for protecting the health and physical well-being of a worker exposed to the product under normal or accidental conditions of use, handling, or storage of this product.

PROTECTIVE EQUIPMENT TO BE USED

This subsection specifies the parts of the body to be protected and the type of protective equipment appropriate to the contaminant exposure and the regulations in force in Québec. For more information on the respiratory protective equipment to use in Québec, consult the following Web site:
www.prot.resp.csst.qc.ca.

Example

Xylene

Respiratory tract

From 100 ppm, wear an appropriate respirator.

Skin

Gloves: Multilayer polyethylene/ethylene vinyl alcohol/polyethylene (PE/EVAL/PE), polyvinyl alcohol (PVAL), multilayer Viton®/butyl rubber/Viton® or Viton®.

Eyes

Wear safety glasses if there is a risk of splashing.



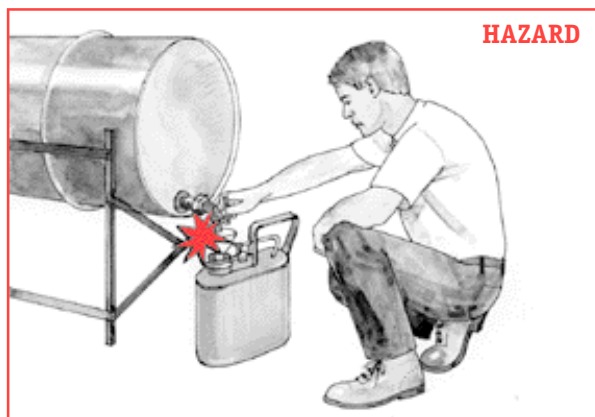
ENGINEERING CONTROLS TO BE USED

This subsection contains the specific procedures to apply to handle the product safely.

Example

Xylene

This flammable liquid must be handled in compliance with the *Flammable and Combustible Liquids Code* NFPA 30. Use tools that will not produce sparks. Wear the appropriate protective clothing and ventilate adequately. Equipment must be grounded and bounded: refer to NFPA 77 code.



PROCEDURES TO BE FOLLOWED IN CASE OF LEAK OR SPILL

This subsection contains procedures to apply in the event of accidental leaks or spills of the product as well as the means of disposing of it.

Example

Toluene

In the event of accidental leaks or minor spills, absorb with sand or any other non-combustible absorbent material. Place the mixture in a well-identified airtight container so that it can be treated later in compliance with the regulations in force.



WASTE DISPOSAL

The steps to be taken for product waste disposal are explained in this subsection.

Example

Xylene

Ventilate the site of the spill well so that the remainder of the liquid evaporates and the vapours disperse. Do not pour the waste into the sewer and do not dispose of contaminated absorbents in the garbage. If necessary, consult the regional office of the ministère de l'Environnement. Dispose of it in compliance with the municipal, provincial and federal regulations in effect.

HANDLING PROCEDURES AND EQUIPMENT

Consult the *Handling* subsection to learn how to handle the product safely.

Example

Acetylene

Compressed gas cylinders must not be subjected to violent impact, and a damaged cylinder must never be used. Do not use cylinders of compressed gas for purposes other than those for which they are intended. They must be attached upright or secured in a cart when they are used. Handle them away from all sources of heat and ignition. Use tools that will not produce sparks. Equipment must be grounded.

HAZARD



STORAGE REQUIREMENTS

The *Storage* subsection contains the conditions for safe storage of the product.

Example

Xylene

Store it in a cool and well-ventilated location, away from sources of heat and ignition and incompatible substances. The containers must be grounded.

SPECIAL SHIPPING INFORMATION

The *Shipping* subsection contains the special information relating to the shipping of dangerous goods. For more details, consult the *Regulations* section (*TDG*) of this guide.

HAZARD



FIRST AID MEASURES

This section of the MSDS describes the first aid to be given in the event of poisoning or accidental contact with the product.

Example

Styrene

Inhalation

In the event of inhalation of vapours, take the person to a ventilated location. If the person is not breathing, perform artificial respiration. Call a physician.

Eye contact

Rinse the eyes with plenty of water for 15 to 20 minutes. If the irritation persists, consult a physician.

Skin contact

Rapidly remove contaminated clothing. Wash skin with soap and water.

Ingestion

In the event of ingestion, rinse the mouth with water. If there are unusual symptoms, consult a physician.

REGULATIONS

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

In Québec, the CSST is responsible for applying WHMIS according to the *Regulation respecting information on controlled products* (Québec regulation), the *Controlled Products Regulations* (federal regulation) and the *Hazardous Products Act*.

WHMIS divides hazardous materials into six main classes. These classes are based on the hazard criteria listed in the *Controlled Products Regulations*. A controlled product is a substance that meets one or more classification criteria. This classification can be based on the data inherent in the material or data on its ingredients.

CLASSES



A: Compressed gas



B1: Flammable gases
B2: Flammable liquids
B3: Combustible liquids
B4: Flammable solids
B5: Flammable aerosols
B6: Reactive flammable materials



C: Oxidizing material



D1A: Very toxic material causing immediate and serious effects

D1B: Toxic material causing immediate and serious effects



D2A: Very toxic material causing other effects

D2B: Toxic material causing other effects



D3: Biohazardous infectious material



E: Corrosive material



F: Dangerously reactive material

DISCLOSURE LIST

This list specifies whether a substance is or is not on the disclosure list of regulated ingredients according to the *Hazardous Products Act* and the cut-off concentration at or above which it must be disclosed (namely 0.1% or 1.0%).

Example

Ammonia must be disclosed if its concentration in a mixture is equal to or greater than 1.0% (W/W).

REGULATION RESPECTING OCCUPATIONAL HEALTH AND SAFETY (ROHS)

In Québec, the permissible exposure values for air contaminants are those prescribed by the *Regulation respecting occupational health and safety* (S2.1, R.19), extracts of which are presented below.

The **time-weighted average exposure value (TWAEV)** “is the time-weighted average concentration for an 8-hour workday and a 40-hour workweek of a chemical substance (in the form of gases, dusts, fumes, vapours or mists) present in the air in a worker’s respiratory zone.”

“For any work period equal to or longer than 4 hours but less than 8 hours or a period in excess of 8 hours but less than or equal to 16 hours, an **adjusted average exposure value (AAEV)** must be established in accordance with the *Guide to the adjustment of permissible exposure values for unusual work schedules*, published by the Institut de recherche Robert-Sauvé en santé et en sécurité du travail (www.irsst.qc.ca), as it reads at the time it is applied. Under no circumstance may the AAEV be higher than the TWAEV.”

The **short-term exposure value (STEV)** “is the 15-minute time-weighted average concentration for exposure to a chemical substance (in the form of gases, dusts, fumes, vapours or mists), present in the air in a worker’s respiratory zone which should not be exceeded at any time during a workday, even if the time-weighted average exposure value is not exceeded. The average exposure for a 15-minute consecutive period may be included between the TWAEV and the STEV, insofar as such exposures are not repeated more than 4 times a day and have intervals between them of periods of at least 60 minutes.”

The **ceiling value** “is the concentration never to be exceeded during any length of time whatsoever.”

The regulation also includes **designations and remarks**: Pc (percutaneous), EM (exposure reduced to a minimum), RP (recirculation prohibited), S (sensitization) and the carcinogen designations.

For more details, consult Schedule 1 of the *Regulation respecting occupational health and safety*.

TRANSPORTATION OF DANGEROUS GOODS (TDG)

In Québec, the TDG is regulated by the *Transportation of Dangerous Substances Regulation* of the ministère des Transports of Québec. It was adopted in compliance with the *Transportation of Dangerous Goods Regulations* of Transport Canada, in application of the *Transportation of Dangerous Goods Act*.

DEFINITIONS

PIN (UN): Product Identification Number. Numeric or alphanumeric designation used to identify a substance or a group of substances with the same name as dangerous goods in the regulation.

Class: numeric data used to designate a substance according to the characteristics of the hazard. In the *Transportation of Dangerous Goods Act*, products are divided into nine classes. A substance can be assigned more than one class, with the primary class (describing the main hazard) and the subsidiary class or classes also indicated.

Packing group/risk group: designation in roman numerals used to indicate the packing group or the risk group to which a dangerous good belongs.

Special provisions: numeric designation used to define the specific measures related to handling, the offering for transport or the transportation of dangerous goods.

Explosive limit and limited quantity index: number indicating the maximum amount of the hazardous good that may be handled or transported, or whose transport can be requested.

ERAP index: number indicating the maximum amounts related to ERAP (Emergency Response Assistance Plans), beyond which the dangerous goods are subject to the provisions of ERAP.

Passenger-carrying ship index: number indicating “the maximum quantity of dangerous goods per consignment that can be carried in a passenger carrying ship”.

Passenger-carrying road vehicle or passenger-carrying railway vehicle index: number indicating “the maximum quantity of dangerous goods that can be transported per consignment on a passenger-carrying road vehicle or a passenger carrying railway vehicle”.

Marine pollutant: indicates whether the dangerous goods are marine pollutants.

GLOSSARY

A AAEV

Adjusted average exposure value according to the *Guide to the adjustment of permissible exposure values for unusual work schedules*, published by the Institut de recherche Robert-Sauvé en santé et en sécurité du travail.

Absorption

Passing of a substance from outside to inside the body. Absorption pathways are routes by which a substance enters the body without injury. The usual routes in the workplace are the respiratory tract (by inhalation) and skin (cutaneous penetration). The digestive tract (ingestion) is the least common.

ACGIH®

American Conference of Governmental Industrial Hygienists. Non-governmental American organization of industrial hygienists from governmental agencies. The ACGIH® develops and publishes recommended exposure standards for chemicals and physical agents as well as a list of biological exposure indices.

Acid

A chemical substance that can release a hydrogen ion (H^+). Acidity is measured in pH units from 0 to 7, where 7 is neutral and 0 very acid. According to WHMIS, a substance is a corrosive material if its pH is equal to or less than 2, when precise data are lacking.

Active (or reactive) metals

Metals that react easily and rapidly with water, acids or alkalis (examples: sodium, aluminum and zinc).

Alkalis

Carbonates, hydroxides, silicates, etc., of alkali metals (examples: sodium hydroxide, potassium hydroxide, etc.). Alkalis are basic and often corrosive substances.

Alopecia

Total or partial loss of hair, usually temporary.

Anemia

Reduction in the number of red blood cells or the amount of hemoglobin per unit volume of blood.

Anhydrous

Environment that does not contain any water, as opposed to humid, or a substance that does not contain water, as opposed to hydrated.

Anorexia

Reduction or loss of appetite.

Anoxia

Reduction in the amount of oxygen carried by the blood into the tissues.

Anuria

Absence of urine in the bladder.

Apathy

Absence of feeling with indifference to outside stimuli.

Apnea

Transient cessation of breathing.

Argyria

Poisoning by silver and its salts.

Arrhythmia

Disturbance in the heart rate.

Asphyxia

Difficult breathing or respiratory arrest.

Asthenia

Reduction or loss of strength (physical and psychic).

Asthma

Respiratory illness caused by an inflammatory reaction of the bronchi with symptoms such as difficult breathing, cough and wheezing.

Ataxia

Incoordination of movements.

Atrophy

Reduction in the weight and volume of an organ, tissue or cells.

B Base

A chemical substance that can release a hydroxide ion (OH^-). Basicity is measured in pH units from 7 to 14, where 7 is neutral and 14 very basic. According to WHMIS, a substance is a corrosive material if its pH is equal to or greater than 11.5, when precise data are lacking.

Biological exposure indices (BEI®)

Numerical value used to evaluate the amount of a substance absorbed by the body. The substance or one of its metabolites is measured in a tissue, a biological liquid or in the expired air. This designation is published by the ACGIH®. The French equivalent is IBE (*Indices biologiques d'exposition*).

Biological monitoring

Periodic monitoring of one or more biological media (blood, urine, etc.) in order to determine the absorption of a contaminant following exposure.

Blindness

Loss of sight.

Blood lead concentration

Amount of lead in the blood.

Bond, To

To connect all conductive components in an electrical installation together.

Bradycardia

Slowing of the heart rate.

Bronchitis

Inflammation of the bronchi.

Bronchoconstriction

Contraction with narrowing of the bronchi.

Bronchospasm

Spasmodic contraction of the muscles surrounding the bronchi.

Byssinosis

Pulmonary disorder due to the chronic inhalation of cotton dust.

C Carcinogenic (Effect)

Indicates that the product may cause cancer.

CAS number

Number assigned by the *Chemical Abstracts Service*, a division of the *American Chemical Society*, to identify a chemical substance. It is recognized by the characteristic presence of two dashes always located at the same place. Example: 12345-67-8.

Central nervous system (CNS)

System consisting of the brain and spinal column. The effects of contaminants on the CNS can be the following: headache, nausea, vomiting, dizziness, incoordination, drowsiness, anesthesia, convulsions, etc.

Cephalgia

Headache.

Characteristics of an exposure

Defines or characterizes the exposure to a substance by establishing relationships between the product's physical properties or between them and the data used in industrial hygiene.

Chlorhydrate

Chemical substance with at least one amine group, which combines with hydrogen chloride in a well-defined proportion (for example, hydroxylamine chlorhydrate).

Cholinesterase

Enzyme present in the blood (causes the hydrolysis of choline esters).

CIRC

Centre international de recherche sur le cancer.

CIRC evaluates and publishes information on the carcinogenicity of various products. The English equivalent is IARC (*International Agency for Research on Cancer*).

Cirrhosis

Chronic progressive disease affecting the liver's structure and function.

Collapse

Rapid reduction in strength or the collapse of an organ, which may result in shock.

Combustion products

Contaminants originating from the complete combustion of the product in air. Their nature and quantity depend greatly on the temperature and amount of air (oxygen). For example, fire could produce substances very different from those that are given off when the substance is handled at high temperatures (thermal decomposition products).

Congestion

Abnormal accumulation of blood in the vessels of a tissue, organ or part of the body.

Conjunctivitis

Inflammation of the conjunctiva (mucous membrane covering the eye).

Convulsions

Violent involuntary muscle contractions.

Corrosion

Destruction of biological tissue (skin, cornea, etc.) or materials. When precise data are lacking, according to WHMIS, a substance is a corrosive material if its pH is equal to or less than 2 or equal to or greater than 11.5.

Cutaneous

Related to the skin.

Cyanosis

Bluish coloration of the skin and mucous membranes produced by a lack of oxygen.

D Degeneration

Abnormal change in an organ, a tissue or faculty, leading to a change in its functioning, but not always permanent.

Deliquescent

Substance that absorbs moisture from the air to the point of becoming liquid.

Dental erosion

Surface erosion of the teeth.

Dermatitis

Inflammation of the skin.

Dermatosis

Generic name for all skin disorders.

Desquamation

Abnormal shedding of the surface layers of the skin in small flakes.

Development (Effects on)

Indicates that the substance may have effects during prenatal development (before birth) and/or postnatal development (after birth until puberty). These effects include malformations (teratogenic effect), effects that may affect the embryo or the fetus (retarded growth, reduction in body weight, death, etc.) as well as postnatal effects (behavioural disorders, etc.).

DNA

Deoxyribonucleic acid (DNA) is a macromolecule (giant molecule) in the form of two complementary strands wrapped around each other in a double helix. DNA is the main component of chromosomes, and therefore the carrier of genetic material.

Diuretic

Increases the urinary output.

DIVS

Danger immédiat pour la vie ou la santé. This is the maximum concentration of a product present in an environment from which an individual can escape in a 30-minute period, without having symptoms that prevent him from escaping and without suffering irreversible health effects. This concentration has been defined in order to be able to choose an appropriate respiratory protective device. (This designation is published by NIOSH, *National Institute for Occupational Safety and Health*; the English acronym is IDLH: Immediately Dangerous to Life or Health.

Dysarthria

Difficulty articulating words.

Dysphagia

Difficulty swallowing.

Dysphonia

Change in voice.

Dyspnea

Difficulty breathing.

Dysuria

Difficulty urinating.

E Edema

Diffuse swelling caused by infiltration of liquid into the tissues.

Embryo

Product of conception from the fertilized egg to the end of the third month of pregnancy. The embryo stage precedes the fetal stage.

Embryotoxic

Toxic effect on the embryo.

Encephalopathy

Disease affecting the brain in general.

Epigastric

The region located between the ribs and the sternum above, the sides of the abdomen, and the umbilical region below.

Epithelium

Tissue that covers the external surfaces (skin, mucous membrane of natural orifices) and inside surfaces of the body (digestive tract, glands).

Erythema

Redness of the skin due to dilation of the capillaries.

Eschar, escharification

Necrosis of a skin tissue or mucous membrane, forming a blackish crust.

Euphoria

Intense feeling of well-being.

Expectoration

Expulsion by the mouth of secretions from the respiratory tract (sputum).

F Fasciculation

Isolated, involuntary and uncontrollable contraction of a group of muscle fibres (never resulting in movement).

Flatulence

Accumulation of gas in the digestive tract.

Fluorosis

Characteristic chronic poisoning caused by fluorine and its derivatives.

Fetotoxic

Toxic effect on the fetus.

Fetus

Product of conception from the end of the third month of pregnancy to the end of intrauterine life. The fetal stage follows the embryonic stage.

G Gastroenteritis

Simultaneous inflammation of the mucous membrane of the stomach and small intestine.

Gene

Heredity-carrying material located on the chromosomes inside the nucleus.

Granuloma

Small benign nodular inflammatory tumour.

Ground, To

To connect all conductive components in an electrical installation to the ground.

H Hematemesis

The vomiting of blood.

Hematoma

Localized accumulation of blood in a tissue.

Hematopoietic system

System responsible for the formation of blood cells (includes the bone marrow and the lymphatic organs).

Hematuria

Presence of blood in the urine.

Hemoglobinuria

Presence of hemoglobin in the urine.

Hemolysis

Destruction of red blood cells, releasing hemoglobin.

Hemorrhage

Loss of blood.

Hepatomegaly

Enlargement of the liver.

Hepatotoxic

Toxic to the liver.

Hydrate

Chemical substance combined with water in a well-defined proportion. The adjective can be preceded by the prefixes mono-, di-, tri-, etc. (example: calcium sulfate dihydrate).

Hydrolysis

Chemical reaction (fragmentation) of a substance into several other smaller substances by the chemical addition of water. Occurs in an aqueous environment, which can induce the formation of new substances.

Hygroscopic

Substance that tends to absorb moisture from the air.

Hyperemia

See the definition of congestion.

Hyperpigmentation

Excessive skin pigmentation.

Hyperplasia

Increase in the number of normal cells.

Hyperreflexia

Exaggeration of reflexes.

Hypertension

High blood pressure.

Hypotension

Low blood pressure.

Hypothermia

Lowering of body temperature below normal (37°C).

I IARC

International Agency for Research on Cancer. IARC evaluates and publishes information on the carcinogenicity of various products. The French equivalent is CIRC (*Centre international de recherche sur le cancer*).

Icterus (jaundice)

Yellow coloration of the skin and mucous membranes.

IDLH

Immediately Dangerous to Life or Health. This is the maximum concentration of a product present in an environment from which an individual can escape in a 30-minute period, without having symptoms that prevent him from escaping and without suffering irreversible health effects. This concentration has been defined in order to be able to choose an appropriate respiratory protective device. (This designation is published by NIOSH, *National Institute for Occupational Safety and Health*; the French acronym is DIVS: *danger immédiat pour la vie ou la santé*.)

Immunosuppression

Reduction in the immune response (body's defence mechanism).

IBE

Indices biologiques d'exposition. Numerical value used to evaluate the amount of a substance absorbed by the body. The substance or one of its metabolites is measured in a tissue, a biological liquid or in the expired air. This designation is published by the ACGIH®. The English equivalent is BEI® (Biological exposure indices).

Insoluble

A substance that cannot be dissolved in a solvent or a given liquid.

Irritability

Abnormal response to stimuli.

Irritation

Reversible changes in the skin, eyes or mucous membranes (examples: redness, inflammation).

K Keratitis

Inflammation of the cornea (front part of the eye).

Keratoconjunctivitis

Inflammation of the cornea and conjunctiva of the eye.

L Lacrimation

Involuntary flow of tears.

Laryngitis

Inflammation of the larynx.

Latency

State of what exists unseen but that can manifest itself at any time.

Lethargy

Deep and prolonged sleep or extreme indifference.

Leucopenia

Reduction in the number of white blood cells.

Lymphocytosis

Increase in the number of lymphocytes (type of white blood cells).

M Manganism

Chronic poisoning caused by manganese and some of its derivatives.

Material

Term used in the federal law relating to WHMIS (*Hazardous Products Act*). This generic term also includes pure substances as well as mixtures.

Metabolic acidosis

Disturbance of the body's acid-base balance. It corresponds to an excess of acid in the blood. The acid-base balance is the constant balanced ratio of the acids and bases in the body.

Methemoglobin

Hemoglobin whose ferrous iron has been oxidized to ferric iron, which makes it unable to carry oxygen.

Methemoglobinemia

Presence of abnormal concentrations of methemoglobin in the blood, resulting in cyanosis.

Miction

To urinate.

Miscible

Substances that dissolve completely in each other and form only one phase.

Molecular formula

Representation of the chemical elements that make up a pure substance as well as their relative proportions.

Mucous membranes

Membranes that line body cavities and that are covered with a viscous substance (mucus).

Mutagenic (Effect)

Indicates that the substance can cause changes in the genes (carriers of hereditary information).

N Narcosis

Induced sleep.

Necrosis

Cell death, tissue death.

Nephritis

Kidney inflammation.

Nephropathy

Any disease of the kidney.

Nephrotoxic

A substance toxic to the kidneys.

Neurasthenia

Psychiatric disorder included in the group of neuroses and characterized by asthenia.

Neuropathy

Any disorder of the nervous system.

Neuropathy (peripheral)

Disorder of the peripheral nerves.

Neurotoxic

A substance toxic to the nervous system.

Neuritis

Inflammation of a nerve.

NTP (Normal temperature and pressure)

Normal temperature and pressure, namely 20°C and 760 mm Hg (101.32 kPa).

Nystagmus

Involuntary oscillating or rotating movement of the eyeballs.

O Oliguria

Reduction in the amount of urine secreted by the kidneys.

P Palpitation

Awareness of one's own heartbeat, felt as a disturbing and sometimes painful phenomenon.

Paresthesia

Anomaly in the perception of sensations, or a spontaneous non-painful subjective sensation.

Patch test

A patch test consists of applying a small quantity of allergen to the skin, which is covered with a material (occlusion). The objective of this test is to reproduce eczema over a limited area. It is useful in identifying the allergens responsible for eczema.

Peritonitis

Inflammation of the peritoneum (membrane lining the abdominal cavity and covering certain organs).

Petechiae

Subcutaneous hemorrhage characterized by small red spots.

Pharyngitis

Inflammation of the pharynx (throat).

Photophobia

Unpleasant and painful feeling in the eyes, caused by light.

Photosensitive

Substance that changes in the presence of light.

Photosensitization

Abnormal reaction (sensitization) of the skin to light.

Pneumoconiosis

Chronic lung disease due to the inhalation of certain types of dusts.

Pneumonia

Acute lung infection characterized by inflammation.

Pneumonitis (chemical)

Lung inflammation caused by exposure to a chemical.

Pneumopathy

Any pulmonary disease.

Polyneuritis

Inflammation of several nerves.

Polyuria

Excretion of an abnormally large amount of urine during a given period.

ppm

Measurement of concentration by volume.

Concentration is expressed in parts per million, for example in cm^3 of the substance per million cm^3 of air. By analogy, one part per million (1 ppm) represents the volume occupied by an orange in a carload of goods or a dollar coin in one million dollar coins.

Procarcinogen

Substance that must be changed by the body to become a carcinogen.

Product

This term applies to a pure chemical as well as a mixture.

Promoter (of carcinogenesis)

Substance capable of promoting the carcinogenic effect of another substance (subsequent exposure).

Prostration

Extreme exhaustion.

Psychosis

A group of mental illnesses characterized by a change in personality and a loss of contact with reality.

Pulmonary emphysema

Disease characterized by the dilation or destruction of the pulmonary alveoli.

Pulmonary fibrosis

Chronic lung disease producing progressive respiratory insufficiency.

Pulmonary granulomatosis

Pulmonary lesion characterized by the formation of small nodules (granuloma).

Pyrophoric

Substance that ignites spontaneously in air.

R Rad

Radiation Absorbed Dose. Unit of an absorbed dose of ionizing radiation.

Radiomimetic

Having an action identical to that of ionizing radiation.

RADS

Reactive Airways Dysfunction Syndrome. Also called asthma without latency period. It is caused by exposure to high concentrations of irritating substances.

Respiratory zone

Zone inside a hemisphere of 300-mm radius extending in front of the face and with its centre on an imaginary line joining the ears.

Rhinitis

Inflammation of the mucous membrane of the nasal passages.

ROHS

Regulation respecting occupational health and safety

S Saturnism

Poisoning by lead or its salts.

Sensitization

Reaction of the body resulting from exposure to a physical, chemical or biological agent leading to an allergic response of the respiratory tract (rhinitis, asthma) or of the skin (eczema). Exposure to the sensitizing agent may not have produced any prior consequence until the initial allergic response occurs.

Siderosis

Infiltration of tissues by inhaled iron dusts or by iron compounds. **Pulmonary siderosis** is a pneumoconiosis caused by the accumulation of iron dusts in the pulmonary alveoli.

Silicosis

Pneumoconiosis, lung disease caused by the inhalation of crystalline silica dust.

Stenosis

Narrowing of a natural duct or orifice.

STEV

Short-term exposure value.

STP (Standard temperature and pressure)

Standard temperature and pressure, namely 0°C and 760 mm Hg (101.32 kPa).

Strabismus

Failure of two visual axes to converge on a fixed point (causing cross-eyes).

Sublimation

To go directly from the solid to the gaseous state without going through the liquid state.

Substance

Term generally used in federal legislation (*Transportation of Dangerous Goods Act*) and provincial legislation (*Regulation respecting occupational health and safety*). This term applies to a homogeneous material of defined chemical composition that cannot be separated by a mechanical process. This definition therefore does not apply to solutions, dispersions, alloys, etc., which are mixtures of several substances. Examples: oxygen (O₂), hydrogen chloride (HCl).

Syncope

Complete temporary loss of consciousness following cardiac and respiratory arrest.

T Tachycardia

Rapid heart rate.

Tachypnea

Abnormally rapid breathing.

Tetanic

Said of a persistent muscle contraction.

Thrombocytopenia

Reduction in the number of blood platelets.

Toxicokinetic

Study of the fate of a toxic substance in the body. The amount of substance that acts with the body to cause a harmful effect depends on four main biological factors, namely absorption, distribution, metabolism (or biotransformation) and excretion.

Tumorigenic

Tumour producing.

TWAEV

Time-weighted average exposure value.

U Ulceration

Formation of ulcers.

UN number

Alphanumeric designation (two letters, UN, followed by four digits) used to identify a hazardous good or a group of hazardous goods with the same characteristics. It is also used to identify rapidly a substance when it is transported in North America.

V Vasoconstriction

Contraction with narrowing of the blood vessels.

Vasodilation

Dilation of the blood vessels.

Ventricular fibrillation

Rapid and irregular contractions of the muscle fibres of the heart ventricles, characterized by an irregular pulse and that may lead to a stoppage in cardiac output.

MEASUREMENT UNITS

°C	degree Celsius
cm	centimetre
kg	kilogram
g	gram
kPa	kilopascal
l	litre
m	metre
m ³	cubic metre
mg	milligram
ml	millilitre
mm	millimetre
mm Hg	millimetre of mercury
mppcf	million particles per cubic foot of air
mSv	millisievert
Pa	Pascal
ppb	parts per billion
ppm	parts per million
Sv	sievert
µg	microgram
µm	micrometre or micron

CONVERSION FACTORS

To convert mg/m^3 into ppm
at 25°C and 760 mm Hg (101.32 kPa)*

$$\text{ppm} = \text{mg/m}^3 \times \frac{24.45}{\text{molecular weight}}$$

To convert ppm into mg/m^3
at 25°C and 760 mm Hg (101.32 kPa)*

$$\text{mg/m}^3 = \frac{\text{ppm} \times \text{molecular weight}}{24.45}$$

To convert mg/l into mg/m^3

$$1 \text{ mg/m}^3 = \text{mg/l} \times 1000$$

To convert mm Hg into kPa

$$\text{kPa} = \text{mm Hg} \times \frac{133.32}{1000}$$

To convert $^\circ\text{F}$ into $^\circ\text{C}$

$$^\circ\text{C} = \frac{(^{\circ}\text{F} - 32) \times 5}{9}$$

To convert $^\circ\text{C}$ into $^\circ\text{F}$

$$^\circ\text{F} = \frac{(^{\circ}\text{C}) \times 9 + 32}{5}$$

To convert log Pow into the coefficient of water/oil distribution

$$\text{Coefficient of water/oil distribution} = 10^{-(\log \text{Pow})}$$

To convert the coefficient of water/oil distribution into log Pow

$$\text{Log}_{10} \text{Pow} = -\log_{10} (\text{coefficient of water/oil distribution})$$

*Only applies to gases and vapours.

SERVICES OFFERED

What services are offered by the CSST's Service du répertoire toxicologique for chemical and biological contaminants?

- Information on chemical and biological substances taken from the product database. It contains information on physical and chemical characteristics, toxicological properties, preventive measures, first aid and regulations. The Service's web site contains a list of useful links, a glossary, as well as various documents.
- Information on WHMIS.

How can you access the services offered?

- Through the web site at the following address: www.reptox.csst.qc.ca.
- By telephone, from 8:30 a.m. to 4:30 p.m. from Monday to Friday inclusively, except statutory holidays, by asking for the professional on duty.
- By mail.
- By e-mail.
- By fax.
- By coming to the office during working hours.

ADDRESS

Service du répertoire toxicologique
1199, rue De Bleury, 4^e étage
Montréal (Québec) H3B 3J1
Telephone: (514) 906-3080
Toll-free: 1 888 330-6374
Fax: (514) 906-3081
E-mail: reptox@csst.qc.ca

CSST REGIONAL OFFICES

ABITIBI-TÉMISCAMINGUE

33, rue Gamble Ouest

Rouyn-Noranda

(Québec) J9X 2R3

Tel. (819) 797-6191

1 800 668-2922

Fax (819) 762-9325

2^e étage

1185, rue Germain

Val-d'Or

(Québec) J9P 6B1

Tel. (819) 354-7100

1 800 668-4593

Fax (819) 874-2522

BAS-SAINT-LAURENT

180, rue des Gouverneurs

Case postale 2180

Rimouski

(Québec) G5L 7P3

Tel. (418) 725-6100

1 800 668-2773

Fax (418) 725-6237

CHAUDIÈRE-APPALACHES

777, rue des Promenades

Saint-Romuald

(Québec) G6W 7P7

Tel. (418) 839-2500

1 800 668-4613

Fax (418) 839-2498

CÔTE-NORD

Bureau 236

700, boulevard Laure

Sept-Îles

(Québec) G4R 1Y1

Tel. (418) 964-3900

1 800 668-5214

Fax (418) 964-3959

235, boulevard La Salle

Baie-Comeau

(Québec) G4Z 2Z4

Tel. (418) 294-7300

1 800 668-0583

Fax (418) 294-8691

ESTRIE

Place-Jacques-Cartier

Bureau 204

1650, rue King Ouest

Sherbrooke

(Québec) J1J 2C3

Tel. (819) 821-5000

1 800 668-3090

Fax (819) 821-6116

GASPÉSIE-ÎLES-DE-LA-MADELEINE

163, boulevard de Gaspé

Gaspé

(Québec) G4X 2V1

Tel. (418) 368-7800

1 800 668-6789

Fax (418) 368-7855

200, boulevard Perron Ouest

New Richmond

(Québec) G0C 2B0

Tel. (418) 392-5091

1 800 668-4595

Fax (418) 392-5406

ÎLE-DE-MONTRÉAL

1, complexe Desjardins

Tour sud, 30^e étage

Case postale 3

Succursale Place-Desjardins

Montréal

(Québec) H5B 1H1

Tel. (514) 906-3000

Fax

Montréal – 1: (514) 906-3133

Montréal – 2: (514) 906-3232

Montréal – 3: (514) 906-3330

Montréal – 4: (514) 906-3434

LANAUDIÈRE

432, rue De Lanaudière

Case postale 550

Joliette

(Québec) J6E 7N2

Tel. (450) 753-2600

1 800 461-4489

Fax (450) 756-6832

LAURENTIDES

6^e étage

85, rue De Martigny Ouest

Saint-Jérôme

(Québec) J7Y 3R8

Tel. (450) 431-4000

1 800 465-2234

Fax (450) 432-1765

LAVAL

1700, boulevard Laval

Laval

(Québec) H7S 2G6

Tel. (450) 967-3200

Fax (450) 668-1174

LONGUEUIL

25, boulevard La Fayette
Longueuil
(Québec) J4K 5B7
Tel. (450) 442-6200
1 800 668-4612
Fax (450) 442-6373

MAURICIE ET CENTRE-DU-QUÉBEC

Bureau 200
1055, boulevard des Forges
Trois-Rivières
(Québec) G8Z 4J9
Tel. (819) 372-3400
1 800 668-6210
Fax (819) 372-3286

OUTAOUAIS

15, rue Gamelin
Case postale 1454
Gatineau
(Québec) J8X 3Y3
Tel. (819) 778-8600
1 800 668-4483
Fax (819) 778-8699

QUÉBEC

425, rue du Pont
Case postale 4900
Succursale Terminus
Québec
(Québec) G1K 7S6
Tel. (418) 266-4000
1 800 668-6811
Fax (418) 266-4015

SAGUENAY-LAC-SAINT-JEAN

Place-du-Fjord
901, boulevard Talbot
Case postale 5400
Chicoutimi
(Québec) G7H 6P8
Tel. (418) 696-5200
1 800 668-0087
Fax (418) 545-3543

Complexe du Parc
6^e étage
1209, boulevard du Sacré-Cœur
Case postale 47
Saint-Félicien
(Québec) G8K 2P8
Tel. (418) 679-5463
1 800 668-6820
Fax (418) 679-5931

SAINT-JEAN-SUR-RICHELIEU

145, boulevard Saint-Joseph
Case postale 100
Saint-Jean-sur-Richelieu
(Québec) J3B 6Z1
Tel. (450) 359-2100
1 800 668-2204
Fax (450) 359-1307

VALLEYFIELD

9, rue Nicholson
Salaberry-de-Valleyfield
(Québec) J6T 4M4
Tel. (450) 377-6200
1 800 668-2550
Fax (450) 377-8228

YAMASKA

2710, rue Bachand
Saint-Hyacinthe
(Québec) J2S 8B6
Tel. (450) 771-3900
1 800 668-2465
Fax (450) 773-8126

Bureau RC-4
77, rue Principale
Granby
(Québec) J2G 9B3
Tel. (450) 378-7971
Fax (450) 776-7256

26, place Charles-De Montmagny
Sorel-Tracy
(Québec) J3P 7E3
Tel. (450) 743-2727
Fax (450) 746-1036

Visit the CSST's Web site:
www.csst.qc.ca

NOTES

NOTES



The purpose of this guide is to facilitate the use and understanding of the information in a substance's material safety data sheet, in accordance with the Workplace Hazardous Materials Information System (WHMIS). The guide provides explanations on the content of the Hazardous ingredients, Physical data, Fire or explosion hazard, Reactivity data, Toxicological properties, Preventive measures and First aid measures sections.

**Vice-présidence à la programmation
et à l'expertise-conseil
Direction de la prévention-inspection
Service du répertoire toxicologique**